

Somerset County Park Commission
Environmental Education Center

School Field Trip

Finding Answers in Nature | STEM Curriculum

The Somerset County Park Commission Environmental Education Center is offering two new STEM focused school field trips this year! These tours use the concept of biomimicry. Biomimicry is an approach to innovation that seeks sustainable solutions to human challenges by emulating nature’s time-tested patterns and strategies. This hands-on field trip allows students time outdoors to observe nature in the western edge of the Great Swamp region, one of nature’s best living laboratories!

Stickiness: Learning From Nature How Things Stick Together

3 hours, suggested for grades 3-5

Program Description

This program is designed for young learners to continue to develop skills in science and engineering practices while incorporating observations from natural phenomena. During their nature walk, students practice making age-appropriate observations related to Earth’s operating conditions (sunlight, water, gravity; dynamic equilibrium; limits and boundaries; cyclic processes) and Life’s Principles (evolve to survive; adapt to changing conditions; be

locally attuned and responsive; integrate development and growth; be resource efficient (material and energy); use life-friendly chemistry). After their nature walk, the students engage in a scientific investigation exploring the “stickiness” of various substances that model how nature ‘sticks’ or adheres things together, and how the field of biomimicry borrows ideas from nature. Students spend two hours outdoors, and one hour indoors.



Standards

NGSS Connections:

The learning experiences in this program are helping the students develop their proficiencies necessary for the following NGSS components.

Performance Expectation:

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. *[Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Analyzing and Interpreting Data: Analyze and interpret data to make sense of phenomena using logical reasoning.</p> <p>Engaging in Argument from Evidence: Construct an argument with evidence.</p>	<p>LS4.C: Adaptation: For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all.</p>	<p>Cause and Effect: Cause and effect relationships are routinely identified and used to explain change.</p>

Connections to Engineering, Technology, and Applications of Science

Interdependence of Engineering, Technology, and Science on Society and the Natural World

- Knowledge of relevant scientific concepts and research findings is important in engineering.

Common Core State Standards Connections:

ELA/Literacy:

W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly.
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace.

Mathematics:

MP.2	Reason abstractly and quantitatively.
MP.4	Model with mathematics.
MP.5	Use appropriate tools strategically.
3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.

Architecture: Learning From Nature How To Build Structures

3 hours, suggested for grades 6-10

Program Description:



The goal of this program is to introduce adolescent students to the fundamental concepts of biomimicry and to apply these concepts to problem solving, and in this case, how we can build a structure resistant to forces of nature. The program progresses from a nature walk to engage the students in observing nature for the purpose of applying what they see to human problem solving. During the indoor portion of this program, the students develop the concept of biomimicry, and are then given a problem to solve centered on building a structure that can withstand natural disasters. Using the engineering design process, they design, build, test, and refine their structures. The program finishes with a review of all the topics covered in the program.

This program is designed to encourage adolescent students to view themselves as a component of nature. To do this the students must recognize the six Life Principles (evolve to survive; adapt to changing conditions; be locally attuned and responsive; integrate development and growth; be resource efficient (material and energy); use life-friendly chemistry) in action in the natural world and in the human designed world.





Standards

NGSS Connections:

The learning experiences in this program are helping the students develop their proficiencies necessary for the following NGSS components

Performance Expectation:

HS-LS2-7: Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity. *[Clarification Statement: Examples of human activities can include urbanization, building dams, and dissemination of invasive species.]*

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p>Constructing Explanations and Designing Solutions: Design, evaluate, and refine a solution to a complex real-world problem, based on scientific knowledge, student-generated sources of evidence, prioritized criteria, and tradeoff considerations.</p> 	<p>LS2.C: Ecosystem Dynamics, Functioning, and Resilience: Moreover, anthropogenic changes (induced by human activity) in the environment—including habitat destruction, pollution, introduction of invasive species, over-exploitation, and climate change can disrupt an ecosystem and threaten the survival of some species</p> <p>LS4.D: Biodiversity and Humans *Biodiversity is increased by the formation of new species (speciation) and decreased by the loss of species (extinction). *Humans depend on the living world for the resources and other benefits provided by biodiversity. But human activity is also having adverse impacts on biodiversity through overpopulation, overexploitation, habitat destruction, pollution, introduction of invasive species, and climate change. Thus sustaining biodiversity so that ecosystem functioning and productivity are maintained is essential to supporting and enhancing life on Earth. Sustaining biodiversity also aids humanity by preserving landscapes of recreational or inspirational value.</p> <p>ETS1.B: Developing Possible Solutions: When evaluating solutions it is important to take into account a range of constraints including cost, safety, reliability and aesthetics and to consider social, cultural and environmental impacts.</p>	<p>Stability and Change: Much of science deals with constructing explanations of how things change and how they remain stable.</p> 

Common Core State Standards Connections:

ELA/Literacy:

WHST.9-12.7	Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.
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Mathematics:

MP.2	Reason abstractly and quantitatively.
HSN.Q.A.1	Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.
HSN.Q.A.2	Define appropriate quantities for the purpose of descriptive modeling.
HSN.Q.A.3	Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.



To book a field trip email kbender@scparcs.org or call 908 766-2489 Ext. 332

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Somerset County
Park Foundation